



United States
Department of
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Forest
Service

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Greater Suttle Lake Vegetation Management Project Hydrology Report

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Proposed Action

The Sisters Ranger District is proposing to abate hazard and danger trees as well as remove trees with high dwarf mistletoe ratings or root disease to reduce infestation of other trees which includes land around portions of Suttle Lake, Scout Lake, Dark Lake and approximately 230 ft of Link Creek. A connected action is the burying of existing powerlines at Camp Tamarack which is necessary in order to treat the stand. Approximately 40% of the project area is within the Riparian Reserves (RR) and all of that is within the Intensive Recreation Management Area under the Deschutes Land and Resource Management Plan (LRMP) and none of the Riparian Reserve in the project area is in Late Successional Reserve (LSR). Approximately 98% of the project area falls within the Lower Lake Creek subwatershed (SWS) with less than 5 acres within the Upper Lake Creek SWS.

Management Direction

A number of Forest planning documents and assessments guide the development of the purpose and need and the proposed action. All federal land management activities in the proposed Great Suttle Lake Vegetation Management project area must follow standards and guidelines listed in the 1990 Deschutes National Forest Land and Resource Management Plan (USDA Forest Service 1990), as amended by the Northwest Forest Plan (NWFP) (USDA and USDI 2004), and in accordance with Best Management Practices (WT-5), the Clean Water Act (WT-1) and Executive Orders 11988, 11990, and 12088. All National Forest lands in the proposed project area fall under the guidance of the NWFP. Additional guidance is provided by the Metolius Watershed Analysis (USDA Forest Service 1996) and the Metolius Watershed Analysis Update (USDA Forest Service 2004).

Deschutes National Forest Land and Resource Management Plan

Refer to Fisheries Report for discussion.

Northwest Forest Plan

The Greater Suttle Lake Vegetation Management Project is located in a Tier 1 Key Watershed under the Northwest Forest Plan. Refer to Fisheries Report for discussion.





Metolius Watershed Analysis

Refer to Fisheries Report for discussion.

Clean Water Act

The State of Oregon, as directed by the Clean Water Act (CWA) and the Environmental Protection Agency, is responsible for the protection of rivers and other bodies of water in the public interest. Best Management Practices (BMP) and state-wide management plans are a requirement of the CWA and are used to meet water quality standards. Link Creek, within and upstream of project area, and Lake Creek, downstream of project area, is listed on the Oregon 2012 303(d) list for water quality exceeding the State standards temperature for bull trout spawning and juvenile rearing ($> 12^{\circ}\text{C}$) (ODEQ 2018).

Executive Orders

The following Executive Orders pertain to this project and would be met by following national BMPs and project PDC:

- Executive Order 12088 requires Federal compliance with pollution control standards (i.e. the Clean Water Act).
- Executive Order 11988 requires agencies to avoid adverse impacts associated with the occupancy and modification of floodplains.
- Executive Order 11990 requires agencies to avoid adverse impacts associated with the destruction or modification of wetlands.

Watershed Condition Framework

The Watershed Condition Framework was developed as a nationally consistent, science-based approach to classify the condition of all National Forest System (NFS) subwatersheds as a means to consistently prioritize watersheds for improvement and track condition change over time (Potyondy and Geier 2010). One of the steps in the WCF process is the classification of watershed condition using 24 watershed condition "attributes" to rate 12 watershed "indicators" and produce an overall Watershed Condition Class Rating. Within this context, the three watershed condition classes are directly related to the degree or level of watershed functionality and are classified as follows: Class 1 = Functioning Properly; Class 2 = Functioning at Risk; and Class 3 = Impaired Function. Watersheds are classified using attributes that quantify aquatic physical, aquatic biological, terrestrial physical, and terrestrial biological condition.

All SWSs that intersect the Deschutes National Forest were analyzed during the National Watershed Condition Framework process and updated in 2016. Since then WCF ratings are assessed by each project or environmental impact (ex. wildfire) and adjusted. The Greater Suttle Lake Vegetation Management Project is almost entirely within the Lower Lake Creek SWS. The Watershed Condition Rating for Lower Lake Creek SWS is Functioning At Risk. The Lower Lake Creek Watershed Action Plan describes the subwatershed as rated Functioning at Risk because of water temperatures above the State standard in Lake Creek, aquatic fragmentation because of screens and diversions, and erosional gullies from Highway 20 (USDA Forest Service 2016). The Watershed Action Plan also identifies essential fish passage and water diversion





projects needed to improve the rating, many of which have been completed, but there are still some projects on private land that would still need to be completed. Regardless, Lake Creek is fed by surface water from Suttle Lake that is naturally warmed due to the large surface area exposed to solar radiation, and therefore would likely remain listed on the 303(d) list. As a result, this SWS would likely remain Functioning at Risk.

Existing Condition

The direct, indirect and cumulative effects hydrology analysis area is the Lower Lake Creek subwatershed which is located in the Upper Metolius Watershed. Although a small portion (< 5 ac) of the Upper Lake Creek SWS is in the project area, it is the area surrounding Link Creek which drains directly into Suttle Lake and into the Lower Lake Creek SWS.

The hydrologic resource in the area consists of a number of glacial and volcanic lakes and two perennial streams. Blue Lake is drained by Link Creek which flows into Suttle Lake. Suttle Lake is drained by Lake Creek which eventually flows into the Metolius River below the project area. Dark lake has an unnamed intermittent outflow stream which flows into a subterranean lava tube a few hundred feet downstream, and Scout Lake is a closed basin. There are two small National Inventoried Wetlands in Link Creek Campground. One is a freshwater emergent wetland (1.14 ac.) connected to Suttle Lake and the other is an isolated freshwater forest shrub wetland (0.41 ac.).

Riparian vegetation in the Riparian Reserves is generally located within 20 ft to 100 ft of lakes and streams and within wetlands. Riparian vegetation is generally in good condition around these waterbodies although areas associated with campsites, boat ramps, docks, trails and day use areas have reduced riparian vegetation and lack ground vegetation from years of trampling use. These areas are the most susceptible to sediment transport into waterbodies during rain events, although there is little evidence of substantial movement. In addition, most areas still retain a vegetated zone between the recreation areas and the waterbodies that provide a sediment filter. The exception are some areas along the Suttle Lake trail where user-created trails access the lake and/or wave action is eroding the trail. Recent projects have been implemented to improve these access areas and reduce wave impact to the trail, and the second phase of the project is planned in 2020.

Areas outside of campgrounds and dayuse areas are less impacted and generally contain good vegetative cover and undisturbed soil that combine to readily filter overland flows during rainstorm events. Approximately 15% of the Riparian Reserve of Suttle Lake had a stand replacing burn during the 2003 B&B Fire. In addition, there are extensive hazard and danger trees, as well as future hazard trees as a result of dwarf mistletoe and root rot disease in the Riparian Reserves both in and out of the campgrounds and organizational camps.

Hydrologic connectivity through the valley from Blue Lake to Suttle Lake and down Lake Creek is good due to recent fish passage projects like the Suttle Lake Dam Fish Passage Improvement Project on the outlet of Suttle Lake and other projects on Lake Creek and the outlet of Blue Lake. Flows in both streams in the analysis area, Link Creek and Lake Creek, remain unaltered with the exception of a few small diversions located on Lake Creek several miles downstream of the





project. In Link Creek, the only perennial stream in the project area, stream habitat is generally in good condition but is lacking in large wood with less than 20 pieces per mile (Dachtler 1997). A project to add large wood to the entire length of Link Creek is planned for 2020 but is not analysed under this project.

Both Link Creek and Lake Creek are 303(d) listed for temperature due to both streams being fed by lake surface waters which warm during the summer. Water quality in all three lakes is generally good, although Suttle Lake experiences blooms of blue green algae once or twice during the summer and/or fall and chlorophyll and pH levels become elevated. Past testing of these blooms has not found toxins above levels considered to be harmful to the people (USFS data on file). Known aquatic invasive species found in Suttle Lake are eurasian watermilfoil and the european earsnail.

Aquatic Resource Protection Measures

Riparian Reserve Project Design Criteria

The following Project Design Criteria (PDC) and all applicable Forest Service Best Management Practices (BMP) (USDA Forest Service 2012) would be adhered to for this project.

- Restrict ground-based equipment to existing compacted surfaces within 100 feet of lakes, streams, or wetlands (Units 1, 2, 3, 4, 6, and 9). Fully or partially suspend trees removed from these areas. Hazard trees within 100 ft of lakes in Units 5a, 7 and 8 could be removed by allowing a single out-and-back pass by machinery (“ghost trail”). Fell and leave trees for aquatic habitat and coarse woody debris that cannot be removed without excessive damage. End lining is allowed if the tree can be partially suspended from the large end.
- No equipment on slopes greater than 30% (Unit 6 & 8).
- Landings would only be allowed in already disturbed or compacted areas in Riparian Reserves or with approval from hydrologist or fish biologist for landings located at least 200 ft from lakes or streams on flat ground (All Units).
- Locate hand burn piles at least 100 feet away from live and intermittent stream channels and lakes and outside of riparian vegetation, whichever is greatest. Do not locate burn piles in swales, washes, or depressions (Unit 9).
- Hand burn piles should not cover more than 5% of the area within RRs and should be less than 100 ft² (Unit 9).

Aquatic Project Mitigations

- Decommission all skid trails and landings in Riparian Reserves (may include subsoiling and plant and seed with native species (All Units).
- Identify with fish biologist and recreation specialist approximately 30 trees to be felled into Suttle Lake from Blue Bay Campground, South Shore Campground, Methodist Camp Day Use Area or Link Creek Campground (Units 1, 2, 3&5), 5 trees into Scout





Lake (Unit 4), and 5 trees into Dark Lake (Unit 6) as a mitigation for removing trees from the large wood recruitment areas.

- In the Link Creek primary shade producing area (within 100 ft of Link Ck on the south side) fell towards the creek and leave any live trees proposed for treatment to maintain solar cover (Unit 1).
- Strategically fell some of the trees within 100 ft of waterbodies to reduce user created trails, define campsites, or provide filtering for upslope runoff (Units 1, 2, 3, 4, 5 & 6).

Effects Analysis

Table 1. Hydrology analysis measures for the Greater Suttle Lake Vegetation Management Project.

Measures	No Action	Proposed Action
Acres of ground-based equipment harvest in Riparian Reserves outside of campgrounds and organizational camps.	0	16
Approximate acres of new compacted ground to be used as landings in Riparian Reserves.	0	4
Miles of temporary roads in Riparian Reserves.	0	0
Approximate number of trees harvested in large wood recruitment areas in Riparian Reserves.	0	400
Approximate number of trees felled into the waterbodies from large wood recruitment areas in Riparian Reserves.	0	40

No Action

Sedimentation

Under the Proposed Action, approximately 44% of the Riparian Reserves around the lakes would have received a one entry, comprehensive treatment to abate and remove hazard/danger trees and reduce future hazard/danger trees by sanitation treatments. However, under No Action, danger trees and hazard trees would continue to be abated and fuels treated with some type of contract (i.e. timber sale, commercial or non-commercial firewood sale, etc.) on an as needed basis resulting in more entries into the Riparian Reserve. With each entry, depending on location, ground and vegetation disturbance would occur which could produce more sedimentation than a single entry by having to restart the recovery process each time. Frequency of entry and amount of treatment would continue to worsen in the intensive recreation areas as mistletoe infestation areas and root rot areas grow resulting in potentially more hazard/danger trees and bigger areas of ground and vegetation disturbance in the Riparian Reserves.

Temperature/303(d) list

Effects to water temperature would remain the same given that tree shade is not the driving factor affecting lake water temperature. Link Creek water temperature and its status on the 303(d) list for water temperature exceedances above the State standard would likely remain the same because only approximately 230 ft of stream length is within the project area.





Riparian Reserve Condition

Vegetation stands health would continue to deteriorate in Riparian Reserves as mistletoe and root rot infestations grow. However, it is likely that riparian condition would be unaffected by No Action as riparian plants are not affected by these parasites. As a result of the infestations there may be a spike in large wood recruitment to both the waterbodies and Riparian Reserve as stand mortality continues. Likewise, there may be an associated gap in large wood recruitment as the stand re-establishes over time.

The connected action of the burial of approximately 2,800 feet of powerlines within Camp Tamarack would still occur and would help reduce risk of electrical fire starts from exposed powerlines. have minimal short-term effects on the hydrologic resource. The majority of trenching would occur on existing road corridors where the ground is already hardened and vegetation is lacking. Some of the trenching would occur on segments stubbing to individual structures within the camp where new ground would be disturbed. PDCs are in place to rehabilitate these areas with organic cover and seeding of native plants after they are filled in (see botany report). There is a relatively flat area between the primary road corridor and Dark Lake that is vegetated and capable of filtering overland flows that have the potential to carry sediment toward the lake. As a result, it is expected that this activity would have minimal effects to the water quality of Dark Lake.

Proposed Action

The Proposed Action would have a negligible negative effect on the hydrology resource because project design elements would limit disturbance in the Riparian Reserves, and a potential long-term beneficial effect to vegetation stand condition and large wood recruitment rates from sanitation treatments in the campgrounds and organizational camps. Treatments outside of Riparian Reserves would not affect the hydrology resource because treatments are on gentle slopes (< 30%), far enough away from waterbodies (at least 320 ft away), and at a small enough magnitude (only 150 acres treated outside of Riparian Reserves) to have a hydrology effect. Although approximately 40% of project area is within the Riparian Reserves, much of the treatment in the Riparian Reserves occurs within already disturbed areas within campgrounds and organizational camps. The Proposed Action meets the NWFP standards and guidelines as it does not prevent attainment of the Aquatic Conservation Strategy nor Executive Orders 12088 (Water Quality), 11988 (Floodplains), and 11990 (Wetlands).

The burial of approximately 2,800 feet of powerlines within Camp Tamarack would have minimal short-term effects on the hydrologic resource. The majority of trenching would occur on existing road corridors where the ground is already hardened. Some of the trenching would occur on segments stubbing to individual structures within the camp where new ground would be disturbed. PDCs are in place to rehabilitate these areas with organic cover and seeding of native plants after they are filled in (see botany report). There is a relatively flat area between the primary road corridor and Dark Lake that is vegetated and capable of filtering overland flows that have the potential to carry sediment toward the lake. As a result, it is expected that this activity would have minimal effects to the water quality of Dark Lake.





Sedimentation

Although trees within the Riparian Reserve within the campgrounds and organizational camps would be felled or pushed over (approximately, 50 trees throughout the project area would be pushed over and stockpiled for future stream restoration projects), a majority of the trees can be reached from existing roads, trails, or campsites. Restricting new disturbance adjacent to the lake or stream by limiting ground-based equipment within 100 ft of the lake to already compacted surfaces, maintains the current water quality filter. Down wood, ground vegetation, shrubs, and forest litter adjacent to the lake reduce rain drop impact and help dissipate overland flow, allowing water to infiltrate and sediment and nutrient to deposit on the land. Likewise, restricting ground-based equipment in this zone, prevents the creation of newly compacted surfaces in areas that could result in overland flow and sediment transport to the lake or stream. Trees within this zone that cannot be reached from an existing compacted surface such as a road, trail, campsite, or relic landing would be felled into the lake or campground/organization camp and left or, if they are sanitation trees, dropped from treatment and mistletoe brooms pruned. The exception, is Unit 5a (0.7 ac) within the Methodist Organization Camp in the Riparian Reserve where there are approximately 12 hazard trees, some of which may not be able to be reached from a compacted surface. If felled and left these would create a fuels hazard or swimming hazard due to the abundance of already down wood. Instead, equipment would be allowed a single out-and-back pass to remove hazard trees. Given that the small area affected and that this areas has abundant ground vegetation and roughness, ground disturbance would be negligible. In addition, approximately 40 trees within the 100 ft of waterbodies in the campgrounds and organizational camps could be felled and left, most of which would have some part of the tree reach the lake. The addition of wood in this zone would also help reduce raindrop impact and dissipate overland flow.

Approximately 16 acres of ground-based harvest would occur in Riparian Reserves outside of campgrounds (i.e. roadside units 7 & 8) (Table 1). In the roadside units that occur in the Riparian Reserve, harvest with ground-based equipment would occur on slopes <30% and would primarily occur in the outer portion of the Riparian Reserve approximately 150 ft or more from the lake, with the exception of a portion of Unit 7 and 8. A small portion of Unit 7 adjacent to Scout Lake campground (~ 0.2 ac) and an approximately 2.5 acres of Unit 8 within and to the northeast of the Methodist Camp, extends to the lake. In order to preserve the existing filter capacity of the Riparian Reserve, in the portions of these units within 100 ft of the lake (~ 0.1 ac in Unit 7 and 0.8 ac in Unit 8), equipment would be restricted to existing compacted surfaces and trees that cannot be reached would be long-lined and partially suspended. On these acres, single out-and-back pass ghost trails would be allowed to access hazard/danger trees. Given that the small area affected and that these areas are less used by the public and have abundant ground vegetation and roughness, ground disturbance would be negligible.

In addition, 4 acres of new disturbance could occur as a result of new landings, although these areas would be restricted to the outer extent of the Riparian Reserve and located on relatively flat ground. While some new disturbance would occur in the Riparian Reserve from landings and skid trails, sedimentation effects would be mitigated by rehabilitating these areas by fracturing compaction, seeding and planting. By managing both the existing and future fuel load and hazard/danger trees the amount of reentry needed to abate these things is reduced, as is future





ground disturbance. Overall, the Proposed Action would have a negligible effect on sedimentation as a result of project design criteria and mitigations.

Temperature/303(d) list

Effects to water temperature from the Proposed Action are not predicted. Shade provided to Suttle Lake from trees felled within the primary shade producing area (within 100 ft from the waterbody) is minimal because only approximately 150 live trees would be felled along an approximately 2 mile length of lake. Effects to water temperature in Suttle Lake from a potential minimal reduction in shade would be negligible because the majority of the lake's surface area is not influenced by shade. Similar logic applies to the other lakes where less than 10 live trees could be felled at Scout Lake and less than 30 live trees could be felled at Dark Lake. Although these all within approximately ¼ mile length of each lake, they are primarily on the north side where, due to the angle of the sun, they do not provide much shade. None of the lakes are listed on the Oregon 2012 303(d) list for water quality exceedances above the State standards and the Proposed Action would not affect any of the lake's listing status nor the water temperature in the lakes.

Link Creek is listed on the 2012 Oregon 303(d) list for temperature exceedances above the State standard for bull trout spawning and juvenile rearing of 12° C. The Proposed Action would not affect the 303(d) listing status for Link Creek nor effect water temperature. As a mitigation, any live trees within the primary shade producing area of Link Creek (within 100 ft of Link Ck on the south side) would not be felled to maintain solar cover.

Riparian Reserve Condition

The Proposed Action would not negatively impact the Riparian Reserve Condition and may, over the long-term, provide a beneficial effect to vegetation stand condition and large wood recruitment rates as determined by effects to water quality, Riparian Reserve vegetation condition, and large woody debris recruitment. Sedimentation and temperature, which are the water quality parameters that could be affected by the Proposed Action, are discussed separately in the Effects section of this report. Riparian vegetation in the Riparian Reserves is generally located within 20 ft to 100 ft of lakes and streams and within wetlands. Riparian vegetation would be unaffected by the Proposed Action because no treatment would occur within wetlands and equipment would be restricted to already compacted surfaces within 100 ft of lakes or streams, except in 0.7 acres in Unit 5, 0.1 acres in Unit 7, and 0.8 acres in Unit 8. On these acres, single out-and-back pass ghost trails would be allowed to access hazard/danger trees. Given that the small area affected and that these areas are less used by the public and have abundant ground vegetation and roughness, effects to riparian vegetation would be negligible.

Riparian Reserve vegetation stand condition over the long-term could be slightly improved by removing future fuel loads and by sanitation treatments. As stated in the Purpose and Need, there is a large number of hazard and danger trees and future hazards and danger trees as a result of the interaction of various root and stem diseases. If the hazards/dangers were only abated but not removed then there would be a large fuel load left that could increase the risk of a stand replacing fire in the Riparian Reserve. In the intensive recreation allocation where hazard tree removal is necessary, removing Mistletoe trees that can continue to spread the parasite and planting resistant species to both Mistletoe and root rot could reduce the amount of hazard trees





that need to be felled and removed annually to maintain recreation and fuels standards. By managing both the existing and future fuel load and hazard/danger trees the amount of reentry needed to abate these things is reduced, as is the impact to the Riparian Reserve vegetation.

The large wood recruitment area for the waterbodies is generally the adjacent area within 1 potential tree height, which is approximately 160 ft in the project area. Given other resource concerns regarding fuel loading and recreation, campgrounds and organizational facilities have trees proposed for removal within the large wood recruitment area. Approximately 400 trees within this zone would be removed because felling and leaving this many trees would exceed natural wood recruitment rates given that these trees would likely not naturally all fall over at once nor are all these trees dead. To mitigate short-term effects of large wood recruitment, approximately 40 trees would be felled into waterbodies in the project area (~30 at Suttle Lake, ~5 at Dark Lake and 5 at Scout Lake). This general amount was determined based on current in-water and waterbody bank down wood. Sanitation treatments including planting of resistant species could help improve long-term wood recruitment rates by spreading mortality out overtime.

Cumulative Effects

The Greater Suttle Lake Vegetation Management Project would not incrementally add to negative cumulative effects to the hydrology resource and may provide some beneficial effects to the vegetation stand condition and large wood recruitment rates to the lakes. A potential beneficial effect is predicted because approximately 44% of the Riparian Reserves around the lakes would receive a comprehensive treatment to abate and remove hazard/danger trees and reduce future hazard/danger trees by sanitation treatments under the Proposed Action. Watershed Condition Framework ratings in the Lower Lake Creek SWS would not change, and the potential beneficial effects to the stand would not be enough to change the score. As a result, the WCF rating in Lower Lake Creek SWS would remain the same which is Functioning at Risk.

Past activities that occur in the same project area as the proposed Greater Suttle Lake Vegetation Management project that are associated with the hydrology effects discussed in this report are the B&B Fire, existing recreation facilities around the lakes (i.e. campgrounds, organization camps under Special Use Permit, trails, boat launches, day use sites), Suttle Lake Dam Fish Passage Improvement Project, and the Suttle Lake Trail Improvement Project. As there are no additive negative hydrology effects from the Proposed Action, effects from past actions would remain the same. Strategically felling trees into the lake and within the campgrounds under the Proposed Action may help reduce erosion and user-trail creation from past recreation use, thus adding to the beneficial cumulative hydrology effect.

Current and future foreseeable activities that could occur within the Lower Lake Creek SWS affected by the proposed project are the Link Creek stream restoration project, Phase 2 of the Suttle Lake Trail Improvement Project, replacement of boat ramps at Suttle Lake and continued use of the recreational facilities. Both the restoration projects would help improve riparian conditions and the aquatic resource. No funding has been secured for replacing boat ramps and is not anticipated for at least two years so there would be no overlap with the effects from this project. The continued use of recreational facilities is anticipated to have a similar effect as now.





References

Dachtler, N. 1997. Link Creek Level II Habitat Inventory. Sisters Ranger District. Deschutes National Forest. Bend, OR.

ODEQ. 2018. Oregon 2012 Integrated Report Assessment Database and 303(d) List.
<https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp>

Potyondy, J.P. and T.W. Geier. 2010. Forest Service watershed condition classification technical guide. Watershed, Fish, Wildlife, Air, and Rare Plants, Washington D.C.

USDA Forest Service. 1990. Deschutes National Forest land and resource management plan. Deschutes National Forest, Supervisor's Office. Bend, Oregon.

USDA Forest Service. 1996. Metolius watershed analysis. Sisters Ranger District, Deschutes National Forest, Sisters, Oregon.

USDA Forest Service. 2004. Metolius Watershed Analysis – Update. Deschutes National Forest, Sisters, Ranger District, Sisters, Oregon.

USDA Forest Service. 2012. National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide (FS-990a).

USDA Forest Service. 2016. Lower Lake Creek Watershed Restoration Action Plan. Sisters Ranger District. Deschutes National Forest. Sisters, Oregon.

USDA Forest Service and USDI Bureau of Land Management. 1994. Record of decision for amendments to Forest Service and Bureau of Land Management planning documents in the range of the northern spotted owl and standards and guidelines for management of habitat for late-successional and old growth forest related species in the range of the northern spotted owl. 74 p. [plus Attachment A: standards and guidelines].

